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October 24,1961

EVALUATION OF 1961-62 SPRUCE BUDWORM POPULATIONS IN OREGON AND WASHINGTON

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INTRODUCTION

For the third consecutive year the principal infestations of the spruce budworm in Oregon and Washington were sampled to determine the level and trend of the overwintering population; that is, the generation that will feed in 1962. Methods and procedures used in this year's survey were the same as those used in previous years, in which egg mass density was used as a measure of abundance.1/2/

This year, spruce budworm epidemic infestations recorded by the regional survey totalled 84,800 acres. Infestations in the Blue Mountains of northeastern Oregon collapsed and those in southern Oregon declined considerably. In southern Washington, the infestations increased in both extent and intensity and even higher populations are forecast for next year.

STATUS OF DAMAGE IN 1961

The acreage of epidemic budworm outbreaks in 1960 and 1961 is as follows:

	1960		1961	
Area	Acres	Percent	Acres	Percent
Northeastern Oregon	48,800	17	-0-	-0-
Southern Oregon	215,760	76	55,200	65
Southern Washington	20,960	7	29,600	35
Total	285,520	100	84,800	100

1/ Klein, W.H. Final report on spruce budworm evaluation survey of 1959. U. S. Forest Service, Pac. N. W. Forest and Range Expt. Station. 17 pages. (Processed) May 13, 1960.

2/ Orr, P.W. Evaluation of 1960-61 spruce budworm populations in Oregon and Washington. U. S. Forest Service, Pac. N. W. Forest and Range Expt. Station. 4 pages. (Processed) October 24, 1960.

The intensity of defoliation continued generally light in southern Oregon with a few centers of moderate damage in the Warner Mountains on the Fremont National Forest. In northeastern Oregon no epidemic defoliation was recorded this year. In southern Washington, the damage ranged from light to heavy intensity. Some top and shoot killing has occurred and more is likely to occur next year.

SURVEY METHODS

From August 2 to September 8, a two-or three-man survey crew collected foliage samples from 21 plots, 14 of which had been sampled last year. These plots were located on the Fremont National Forest, Oreg., and on the Glenwood District and Yakima Indian Reservation, Wash. Five plots on the Modoc National Forest, Calif., were sampled cooperatively with Region 5 personnel, because of their relationship and proximity to the outbreak on the Fremont National Forest in Oregon. Data from these five plots will be reported by the Division of Timber Management, Region 5.

Each sample consisted of two half-branches from the mid-crown of five dominant or codominant trees on the plot. At the time of sampling, estimates of defoliation of the current growth and bud-killing were obtained for each of the five trees, and the foliated area of sample branches was measured. Four women examined the sample foliage for budworm egg masses and associated insect material. The material was held in lots on an individual half-branch basis for each tree and plot.

Final examination was made in the laboratory by the author, using a binocular microscope. Budworm egg masses were separated into two categories, those deposited in 1961, "new", and those deposited in 1960 or earlier, "old". Preliminary estimates of parasitism and non-hatch of eggs were made. The occurrence and relative abundance of associated insects was also recorded.

Budworm population levels for the 1961-62 generation were estimated from the 1961 egg mass counts on the basis of normal egg hatch and average size of egg mass.3/ For plots previously established, this entailed a comparison of "new" 1960 egg masses and "new" 1961 egg masses. On new plots, "old" egg masses recorded this year were compared with "new" egg masses. Statistical analyses were made for each plot, using paired trees as the basis. When a t-value for a plot was significant at p=.10, budworm population trend was said to be either definitely upward or downward.

The evaluation survey required 219 man-days: 41 man-days to collect the foliage samples and obtain defoliation estimates, 146 man-days to examine the foliage, and 32 man-days to sort and separate egg masses and associated arthropods. This year's survey required 80 more man-days than last year's. Examination time was increased because three plots were added at Simcoe Butte, Wash., and

3/ Carolin, V.M. and W. K. Coulter. Research findings relative to the biological evaluation of spruce budworm infestations in Oregon. U. S. Forest Service, Pac. N.W. Forest and Range Experiment Station. 39 pages. (Processed) March, 1960.

four were added on the Modoc National Forest in northern California. The abundance of mite eggs on foliage from six of the ten Fremont National Forest plots increased both examination and separation time.

EVALUATION

Spruce Budworm

On the basis of the current budworm populations and their trends, amount of accumulated damage, and degree of parasitism, spraying will be needed in 1962 on 47,000 acres on the Glenwood District and Yakima Indian Reservation in southern Washington to protect timber values. Elsewhere in the Region, the population trends are static or downward. Hence, spraying is not needed on these areas.

Egg mass survey data are summarized in table 1. Evaulation by areas follows:

Southern Washington. The population trend is strongly upward at five of the six plots sampled. Some top-killing has occurred in young white fir stands and more is expected next year. Because of the strong upward population trend for 1962 and the amount of accumulated damage, spraying will be necessary.

Southern Oregon. The extent and intensity of budworm infestation in southern Oregon decreased considerably this year due to the effect of insect parasites and disease during 1960. The 1961-62 feeding population trend is generally strongly downward, except on one small center. These findings, and the history of short outbreaks in the Warner Mountains, indicate that the outbreak is subsiding.

Associated Insects

During the examination of foliage for spruce budworm egg masses, the eggs and other stages of various associated insects were found. The true density of many of these insects cannot be measured accurately at the time of the budworm egg survey. However, the presence or absence of a species at a number of plots indicates its abundance in a very general way. This year eggs of an unknown mite increased in abundance at six of the ten plots on the Fremont National Forest. It is not known whether or not the resulting nymphs and adults will cause damage to the trees. The relative abundance and distribution of other associated insects remained the same as in previous years.

Table 1.--Density of 1961 spruce budworm egg populations and population trends at 16 points in Oregon and Washington

Forest and area	Plot	New egg masses per 1000 sq.in.		Predicted 1961-62 Population	
		1961	1960	Level	Trend
		-- Number --			
Simcoe Butte, Wash.	Simcoe Butte #1	4.4 2/	0.6	Low	Up
	Simcoe Butte #2	7.1 2/	2.3	Medium	Up
	Simcoe Butte #3	13.0 2/	4.5	High	Up
	Simcoe Butte #4	13.0 2/	4.7 1/	High	Up
	Simcoe Butte #5	2.4	0.8 1/	Very low	Static
	Simcoe Butte #6	2.7 2/	0.5 1/	Very low	Up
Fremont N.F., Oreg. Warner Mtns.	Summit Prairie	7.8	10.5	Medium	Static
	Rogger Peak	1.0 2/	5.0	Very low	Down
	Kelly Creek	2.4 2/	7.3	Very low	Down
	Drake Springs	3.0	2.3	Low	Static
	Squaw Butte	8.8	10.6	Medium	Static
Gearhart Mtn.	Picture Flat	0.2 2/	1.3	Very low	Down
	Coleman Point	2.0	2.3	Very low	Static
	Pothole Creek	11.2	9.8	High	Static
	Mitten Springs	0.7	2.5	Very low	Static
	Ryan Cabin	26.9	12.7	Very High	Up

1/ Plot was not established until 1961. 1960 egg density was estimated from "old" egg masses recovered during the 1961 survey.

2/ Significant at p = .10.